Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh) for IBM BladeCenter

IBM BladeCenter at-a-glance guide

The Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh) for IBM® BladeCenter® delivers the industry's lowest latency performance of 10 Gigabit Ethernet connectivity with stateless offloads for converged fabrics in enterprise data centers, high-performance computing, and embedded environments. Financial services, cluster databases, web infrastructure, and cloud computing are just a few example applications that will achieve significant throughput and latency improvements resulting in faster access, real-time response, and increased number of users per server. The adapter is based on Mellanox ConnectX-2 EN technology, which improves network performance by increasing available bandwidth to the CPU, especially in virtualized server environments.

Figure 1 shows the adapter.

Figure 1. Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh) for IBM BladeCenter

Did you know

New enhancements such as Data Center Ethernet (DCE) are being added to Ethernet for better I/O consolidations. The InfiniBand Trade Association's (IBTA) RDMA over Converged Ethernet (RoCE) technology provides efficient low-latency RDMA transport over Layer 2 Ethernet. The RoE software stack maintains existing and future application compatibility for bandwidth and latency-sensitive clustering applications. With link-level interoperability in existing Ethernet infrastructure, network administrators can leverage existing data center fabric management solutions with this adapter.

Part number information

The part number to order this card is shown in Table 1.

Table 1. Ordering part number and feature code

Description	Part number	Feature code
Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh) for IBM BladeCenter	90Y3570	A1NW

These part numbers include the following items:

- One Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh)
- Documentation CD that contains the *Installation and User's Guide*
- Important Notices document

Features and benefits

The Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh) has the features discussed below.

Performance

Based on ConnectX-2 EN technology, the Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh) provides a high level of throughput performance for all network environments by removing I/O bottlenecks in mainstream servers that are limiting application performance. Blade servers in the BladeCenter H and HT chassis can fully utilize both 10 Gbps ports and achieve up to 40 Gbps duplex bandwidth. Hardware-based stateless offload engines handle the TCP/UDP/IP segmentation, reassembly, and checksum calculations that would otherwise burden the host processor. These offload technologies are fully compatible with Microsoft RSS and NetDMA.

RDMA over Converged Ethernet (RoCE) further accelerates application run time. RoCE specification provides efficient data transfer with very low latencies on lossless Ethernet networks. RoCE enables lowest latency memory transaction, with less than 2 µs at full bandwidth with small message size. This allows very high-volume transaction-intensive applications typical of financial market firms and other industries where speed of data delivery is paramount to take advantage. With the Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh), high-frequency transaction applications are able to access trading information with shorter times, making sure that the trading servers are able to respond first to any new market data and market inefficiencies, while the higher throughput enables higher volume trading, maximizing liquidity and profitability.

In data mining or web crawl applications, RoCE provides the needed boost in performance to search faster by solving the network latency bottleneck associated with I/O cards and the corresponding transport technology in the cloud. Various other applications that benefit from RoCE with ConnectX-2 EN include Web 2.0 (Content Delivery Network), Business intelligence, database transactions, and various Cloud computing applications. Mellanox ConnectX-2 EN's low-power consumption (less than 3.5 W per port) provides customers with high bandwidth and low latency at the lowest cost of ownership.

I/O virtualization

ConnectX-2 EN supports hardware-based I/O virtualization, providing dedicated adapter resources and guaranteed isolation and protection for virtual machines (VM) within the server. ConnectX-2 EN gives data center managers better server utilization and LAN and SAN unification while reducing costs, power, and complexity.

Quality of service

Resource allocation per application or per VM is provided by the advanced QoS supported by ConnectX-2 EN. Service levels for multiple traffic types can be based on IETF DiffServ or IEEE 802.1p/Q, along with the Data Center Bridging enhancements, allowing system administrators to prioritize traffic by application, virtual machine, or protocol. This powerful combination of QoS and prioritization provides the ultimate fine-grained control of traffic, ensuring that applications run smoothly in today's complex environment.

Specifications

The Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh) has the following specifications:

- CFFh form-factor
- Two full-duplex 10 Gb Ethernet ports
- PCI Express x8 Gen 2 host interface
- Mellanox ConnectX-2 EN ASIC
- Connectivity to high-speed I/O module bays in BladeCenter H and BladeCenter HT chassis
- Features: Stateless Offload, Priority Flow Control, FCoE Ready
- Power consumption: 6.4 W (typical)
- Stateless iSCSI offload
- BladeCenter Open Fabric Manager support (available early 4Q/2011)
- PXE v2.1 boot support
- Wake on LAN support (available early 4Q/2011)

Ethernet support and standards are:

- IEEE Std 802.3ae 10 Gigabit Ethernet
- IEEE Std 802.3ad Link Aggregation and Failover
- IEEE Std 802.3x Pause
- IEEE 802.1Q, .1p VLAN tags and priority
- Multicast
- Jumbo frame support (10 KB)
- 128 MAC/VLAN addresses per port

Data Center Bridging (DCB) support:

- Enhanced Transmission Selection (ETS) (IEEE 802.1Qaz)
- Quantized Congestion Notification (QCN) (IEEE 802.1Qau)
- Priority-based Flow Control (PFC) (IEEE 802.1Qbb)
- Data Center Bridging Capability eXchange (DCBX) protocol

TCP/UDP/IP stateless offload:

- TCP/UDP/IP checksum offload
- TCP Large Send Offload (< 64 KB) or Giant Send Offload (64 KB - 16 MB) for segmentation
- Receive Side Scaling (RSS) up to 32 queues
- Line rate packet filtering

Additional CPU offloads:

- RDMA over Converged Ethernet support
- FC checksum offload
- VMDirect Path support
- Traffic steering across multiple cores
- Intelligent interrupt coalescence
- Compliant to Microsoft RSS and NetDMA

Hardware-based I/O virtualization:

- Address translation and protection
- Dedicated adapter resources and guaranteed isolation
- Multiple queues per virtual machine
- Hardware switching between guest OSs
- Enhanced QoS for vNICs
- VMware NetQueue support

Storage support:

- Compliant with T11.3 FC-BB-5 FCoE frame format

Operating environment

This card is supported in the following environment:

- Temperature: 0° C to 55° C (32° F to 131° F)
- Operating power: Approximately 6.4 watts
- Dimensions: Approximately 15.9 cm x 12.5 cm (6.26 in. x 4.92 in.)

Warranty

One-year limited warranty: When installed in a BladeCenter server, the card assumes the system's base warranty and any IBM ServicePac® upgrade.

Supported servers

The Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh) is supported in the IBM BladeCenter servers listed in Table 2.

Table 2. Supported servers

Expansion card	Part number	HS12	HS21	HS21 XM	HS22	HS22V	HX5	LS22	LS42	JS12	JS22	JS23/JS43	PS700/1/2
Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh)	90Y3570	N	N	N	Y	Y	Y	N	N	N	N	N	N

Figure 2 shows where the CFFh card is installed in a BladeCenter server.

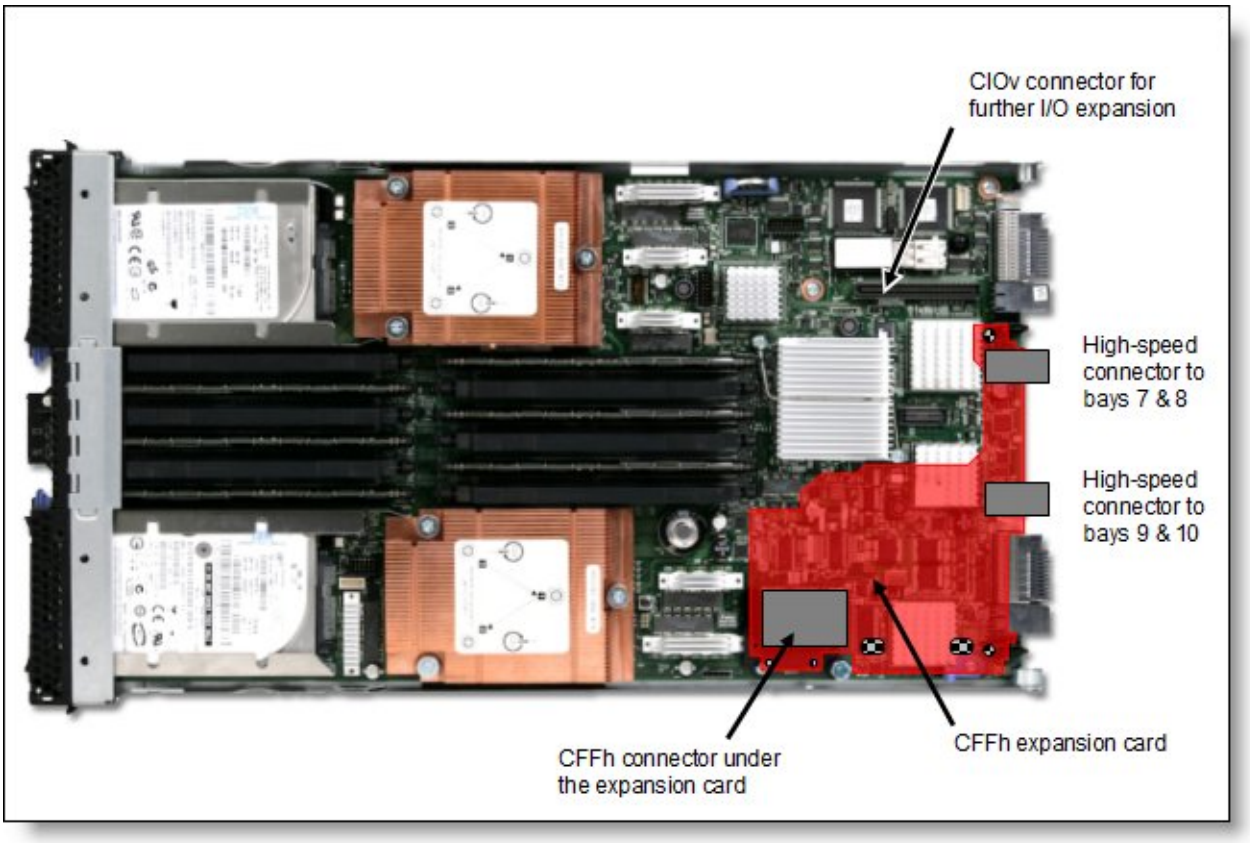

Figure 2. Location on the BladeCenter server planar where the CFFh card is installed

Supported BladeCenter chassis and I/O modules

IBM BladeCenter chassis support is based on the blade server type in which the expansion card is installed. Consult IBM ServerProven® to see which chassis each blade server type is supported at: http://ibm.com/servers/eserver/serverproven/compat/us/.

Table 3 lists the supported chassis and I/O module combinations that the card supports.

Table 3. I/O modules supported with the Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh)

Description	Part number	BladeCenter S	BladeCenter E	BladeCenter H	BladeCenter T	BladeCenter HT	MSIM	MSIM-HT
BNT Virtual Fabric 10 Gb Switch Module	46C7191	N	N	Y	N	Y	N	N
BNT 6-port 10 Gb High Speed Switch Module	39Y9267	N	N	N	N	N	N	N
10 Gb Ethernet Pass-Thru Module	46M6181	N	N	N	N	N	N	N
Cisco Nexus 4001I Switch Module	46M6071	N	N	Y	N	Y	N	N

In BladeCenter H, the ports of CFFh cards are routed through the midplane to I/O bays 7, 8, 9, and 10 (Figure 3). The BladeCenter HT works in a similar way because the CFFh cards are also routed through the midplane to I/O bays 7, 8, 9, and 10.

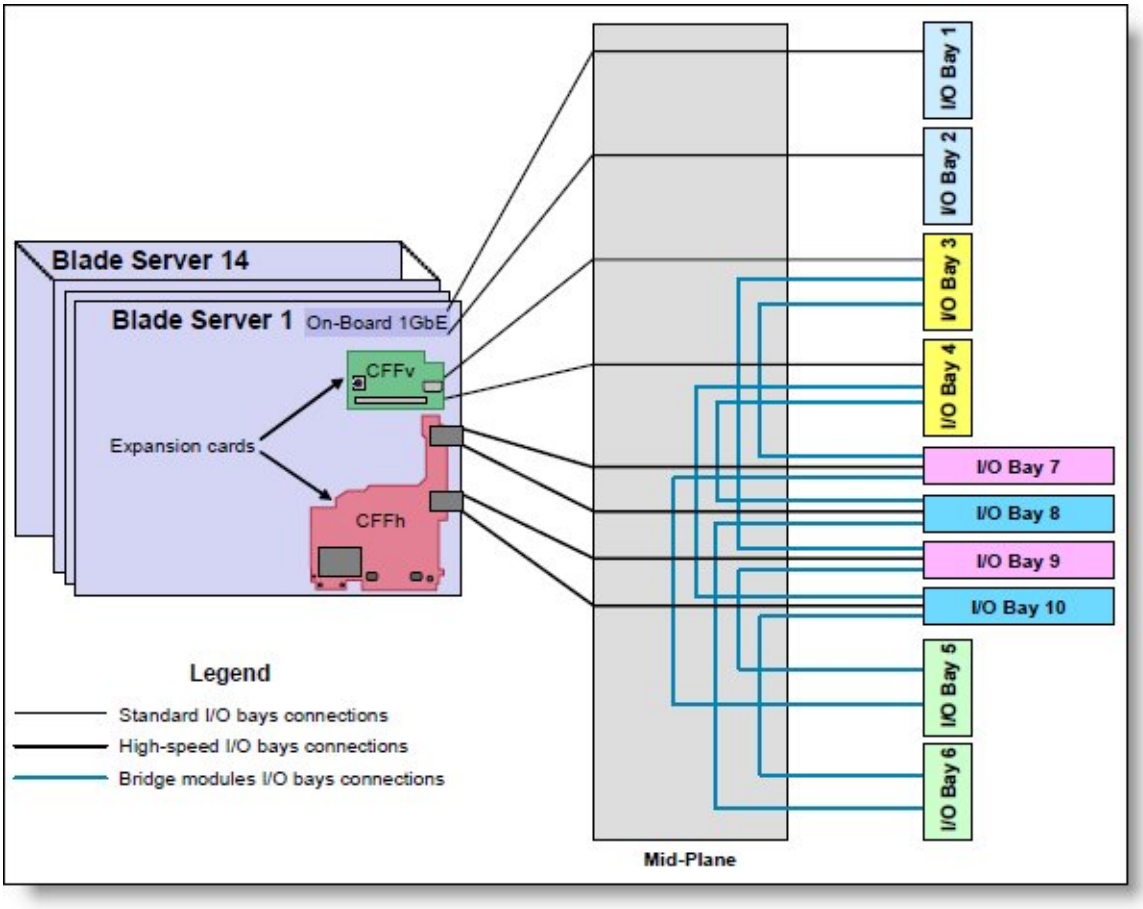

Figure 3. IBM BladeCenter H I/O topology showing the I/O paths from CFFh expansion cards

The Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh) requires that two I/O modules be installed in bays 7 and 9 of the BladeCenter H or HT chassis (Table 4).

Table 4. Locations of I/O modules required to connect to the expansion card

Expansion card	I/O bay 7	I/O bay 8	I/O bay 9	I/O bay 10
Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh)	Supported I/O module	Not used	Supported I/O module	Not used

Popular configurations

Figure 4 shows a configuration using the Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh) together with two BNT Virtual Fabric 10 Gb Switch Modules. This solution enables two 10 Gbps Ethernet connections from each blade server. Two BNT Virtual Fabric 10 Gb Switch Modules are installed in bay 7 and bay 9 of the BladeCenter H chassis. All connections between the controller, the card, and the switch modules are internal to the chassis. No internal cabling is needed.

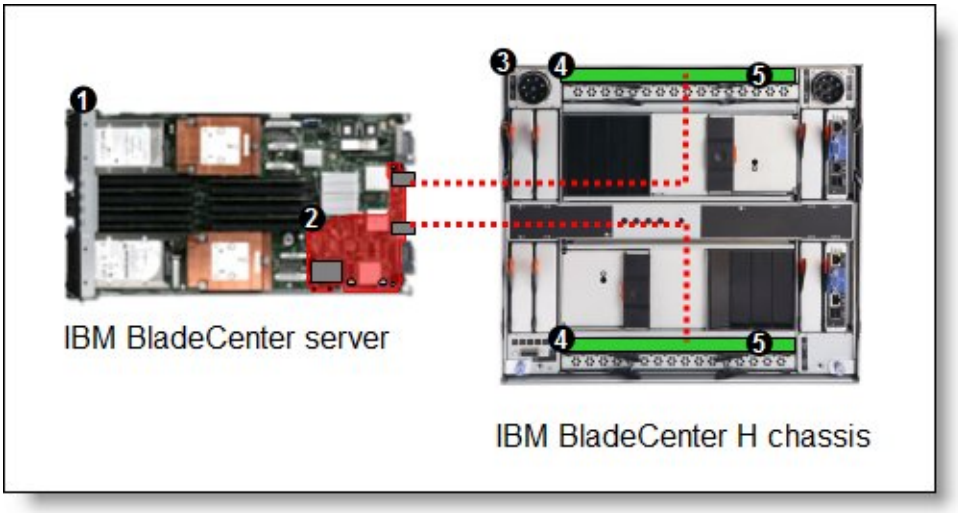

Figure 4. 20 Gb solution using Intel 2-port 10 Gb Ethernet Expansion Card (CFFh)

Table 5 lists the components used in this configuration.

Table 5. Components used when connecting Intel 2-port 10 Gb Ethernet Expansion Card (CFFh) to two BNT Virtual Fabric 10 Gb Switch Modules

Diagram reference	Part number/machine type	Description	Quantity
1	Varies	IBM BladeCenter HS22 or other supported server	1 to 14
2	90Y3570	Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh)	1 per server
3	8852 or 8740/8750	BladeCenter H or BladeCenter HT	1
4	46C7191	BNT Virtual Fabric 10 Gb Switch Module	2
5	44W4408	IBM 10GBase-SR SFP+ Transceiver	Up to 20*

*The BNT Virtual Fabric 10Gb Switch Module has 10 external ports. You must have one transceiver for every external port that you plan to utilize.

Operating system support

The Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh) supports the following operating systems:

- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Standard x64 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- SUSE LINUX Enterprise Server 10 for AMD64/EM64T
- SUSE LINUX Enterprise Server 10 with Xen for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE LINUX Enterprise Server 11 with Xen for AMD64/EM64T
- VMware ESX 4.0
- VMware ESX 4.1
- VMware ESXi 4.0
- VMware ESXi 4.1

Support for operating systems is based on the combination of the expansion card and the blade server in which it is installed. See IBM ServerProven for the latest information about the specific versions and service packs supported by going to the following address:

http://ibm.com/servers/eserver/serverproven/compat/us/.

Select the blade server and then select the expansion card to see the supported operating systems.

Related publications

For more information, see the following documents:

- *Mellanox 2-port 10Gb Ethernet Expansion Card (CFFh) for IBM BladeCenter Installation Guide*
  http://ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5087563
- *IBM BladeCenter Interoperability Guide*
  http://ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5073016
- IBM Redbooks® publication *IBM BladeCenter Products and Technology*, SG24-7523
  http://www.redbooks.ibm.com/abstracts/sg247523.html

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